INSTRUCTION MANUAL

ARMORED FLOWMETERS
10A2227-1

Used with Series 50FT1000
Flow Rate Indicator

SERIES 10A2227 ARMORED FLOWMETER

ABB Automation
SPECIFICATIONS

Accuracy
Standard ........................................... ±5% f.s.
Optional (at extra cost) ......................... ±3% f.s.

Design Pressure @ 100°F (38°C)
NPT Connection .................................... 1500 psig (10.3 MPa)
ANSI Class 150 Flanges ......................... 275 psig (1.9 MPa)

Temperature
Maximum Fluid
- Used w/ Pneumatic Xmt ................................ 0 to 600°F
(−18 to 316°C)
- Used w/ Electronic Xmt ............................. 0 to 400°F
(−18 to 204°C)
- Used w/ Electronic Alarm ......................... 0 to 400°F
(−18 to 204°C)

Ambient
- Used w/ Pneumatic Xmt ............................ −40 to 212°F
(−40 to 100°C)
- Used w/ Electronic Xmt ............................ −40 to 150°F
(−40 to 66°C)
- Used w/ Electronic Alarm ......................... −40 to 150°F
(−40 to 66°C)

Materials
Body .................................................. 316 SST
Retainers ............................................. ARMCO PH 15-7 MD
Flanges (Optional) ................................ 316 SST
Float .................................................. 316 SST

INTRODUCTION

The Fischer & Porter Series 10A2227A Armored Flowmeter is an all metal variable area flowmeter. The meter is intended for vertical installation only. The inlet and outlet connections may be either threaded or flanged, as specified. The NPT internal connection is available in 1/4", 1/2", 1", 1 1/4" and 2" sizes. Flat or raised face ANSI Class 150 flanges are available in 1/2", 1", 1 1/4" and 2" sizes.

Since the meter tube is all metal and the float cannot be seen, a readout device is required. A Series 50FT1000 Flow Rate Indicator is one of the devices used for this purpose. Here, the position of the meter float, which contains a strong permanent magnet, is detected. Refer to the Instruction Bulletin furnished with the Indicator for additional details.

Figure 1 is a cross-section of the meter. In this variable area meter, the float is tapered rather than the tube as in the conventional meter. Notice that the annular area between the orifice bore and the tapered float changes as the float moves vertically. The upward flow will position the float, in dynamic balance, at a position directly proportional to flow rate. The position of the magnet embedded in the float is detected by the referenced Flow Rate Indicator.

INSTALLATION

I. General

The upper end of the meter float extension extends approximately 1" beyond the meter body at maximum flow rate. Because of this, a short length of straight pipe must immediately follow the meter outlet.

The instructions given herein cover generally the description, installation, operation and maintenance of subject equipment. F&P reserves the right to make engineering refinements that may not be reflected in this Bulletin. Should any questions arise which may not be answered specifically by these instructions they should be directed to the Fischer & Porter Co. for further detailed information and technical assistance.

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Since the Armored Flowmeter and its associated Flow Rate Indicator operate on a magnetic bond principal, avoid mounting near heavy electrical equipment; the nearest parallel running pipe line should ideally be 12" away.

The meter float is blocked in place for shipment. Remove the shipping pieces and check that the float is free to travel by moving it with the guide rod.

When installed, the meter tube should be vertical with the outlet at the top. The use of a spirit level or plumb bob to check the vertical alignment is recommended.

II. Process Piping

A. General

If the meter is to be installed in a process pipeline where shut-down is undesirable, a bypass manifold as shown in Figure 2 should be installed. The bypass valve must be absolutely leak tight to maintain the meter’s accuracy. Many customers prefer to install two bypass valves in series to prevent the possibility of leaks. The bypass valve should be a globe type with a resilient seat and be large enough to pass the maximum flow rate. The shut-off valves should be of the gate type so that they do not disturb the flow profile.

If the meter is to be used in a process where stagnant areas in the pipeline are not permitted, the bypass line is not practical.

Maximum working pressure decreases as temperature increases. Refer to ANSI Std. B16.5 for additional information. Make certain that the operating conditions are within the reference specification.

B. Liquid Service

When the Armored Flowmeter is used for liquid service, the piping between the inlet and outlet shut-off valves should be the same as the meter size. Beyond these points the piping should be as large as economically practical. Control valves may be used in either the inlet or discharge piping without regard to the distance from the meter.

![Figure 2. Typical Installation of Meter with Bypass Manifold](image1)

![Figure 3. Typical Installation of Meter for Gas Service](image2)
C. Gas Service

Because gas is compressible, it must be metered at a known constant pressure and temperature (for which the instrument is calibrated). Operation at other conditions requires the use of correction factors. Usually the pressure on the downstream side of a gas flowmeter is maintained to avoid the use of correction factors. Pressure control can be accomplished by discharging into a constant pressure line or a control valve can be used. The control valve could be a simple hand valve or a diaphragm operated valve of some type. If the pressure control valve is placed on the discharge side of the meter keep it as close to the outlet as possible. If the pressure control valve is placed on the inlet side of the meter, place it 5 pipe diameters from the meter connection.

Piping between the inlet and outlet shut-off valves should be the same size as the meter. Beyond the shut-off valves, the piping should be as large as economically practical.

Figure 3 shows a typical installation of a meter used for gas service. Notice that the pressure and temperature are measured immediately downstream of the meter ahead of the pressure control valve.

D. Surge Chambers and Accumulators

Surge Chambers and Accumulators are frequently used on flowmeter installations to smooth out pulsations of the meter float where reciprocating pumps or compressors are used on the feed line to the meter. Surge chambers, when used on liquid service, may have a gas padding pressure applied to the top of the chamber.

When it is objectionable to have a gas padding in contact with the liquid, accumulators are used. Accumulators are similar to surge chambers except that they include a rubber bag which seals the gas from the liquid. Accumulators usually have the rubber bag factory-sealed with nitrogen or other suitable gas, to a pressure of approximately 60% of the pumping pressure. It is recommended that the accumulator manufacturer be consulted for the correct size surge chamber or accumulator required to suite the installation.

MAINTENANCE

There is no routine maintenance to be performed. If the meter is to be disassembled for any purpose, refer to Figure 1, the cross-section, to aid the procedure. In the 1/4" size meter, additional 1/2" x 1/4" reducers are included in the meter's inlet and outlet connections. Also, the upper spacer and bowed retainer ring are not used; in their place is a spring, that holds the outlet float stop, by means of the outlet reducer bushing.

NOTE

When a meter is specified for gas service, the upper guide rod is a twisted design. The upper float stop is modified by the addition of a projection over the guide rod clearance hole. As the float moves vertically, due to changes in flow rate, the projection rides in the twisted slot of the guide rod causing the float to turn. This effectively damps the float's vertical motion, preventing oscillations, so that stable readings are provided.